

**REMARKS**

Applicant respectfully requests reconsideration and allowance of the subject application. Claims 1-25 are currently pending. Claim 17 has been amended in order to correct a typographical error.

**35 U.S.C. §103 CLAIM REJECTIONS**

The Examiner has rejected claims 1-5 and 9-25 as being unpatentable over U.S. Patent No. 3,312,976 to Gregory (hereinafter “Gregory”) in view of German Patent No. DE 197 40 254 to Lindenmeier, et al. (hereinafter “Lindenmeier”). Additionally, the Examiner has rejected claims 6-8 as being unpatentable over Gregory in view of German Patent No. DE 100 34 547 to Weisbeck, et al. (hereinafter “Weisbeck”). Applicant respectfully traverses these rejections.

**The Claimed Invention**

The claimed invention is a multi-band antenna that operates in both the PCS band and the AMPS band. The antenna comprises two slot antenna elements, a transmission line to feed the slot antennas, and a reflector element. The antenna design allows the reflector element to be positioned one-sixth of a PCS band wavelength and one-thirteenth of an AMPS wavelength from the radiating elements. Configuring the antenna using a reflector and an electrically short cavity allows the antenna to be compact enough to be mounted to the top of a front windshield in a vehicle without interfering with visibility, while at the same time preventing radiation from traveling into the passenger compartment of the vehicle.

### Gregory

Gregory discloses a “flashlight” type microwave radiator capable of being hand held and projecting beams of microwave energy in a manner similar to the way an ordinary flashlight projects visible light. The radiator taught in Gregory comprises a front plate having two slots mounted on a metal block containing two semi-circular cavities. A coaxial conductor provides microwave energy to the cavity, and the energy radiates out of the cavity via the slots, thus providing the directional radiating quality desired.

### Lindenmeier

Lindenmeier teaches a multi-band radio antenna arrangement designed to mount on the outside of a vehicle windshield. The antenna arrangement disclosed in Lindenmeier comprises a patch antenna (7) in combination with a bar antenna (3). The patch antenna (7) and bar antenna (3) are grounded to a baseplate (4) and connected to a cable (5). The cable (5) wraps around the windshield and passes into the vehicle, and is used to connect the antenna to electronic equipment inside the vehicle.

### Weisbeck

Weisbeck discloses a broadband antenna comprising a spiral arm located parallel to a reflector. The reflector comprises a dielectric layer and a metallic surface. The distance between the reflector and the spiral arm is calculated to suit a particular frequency range.

The Examiner has not set forth a *prima facie* case of obviousness

As set forth in the MPEP:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skilled in the art, to modify the reference or to combined reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP 2143

In the present case, the Examiner has failed to establish the necessary requirements.

I. There is no suggestion or motivation to combine the cited references

There is clearly no suggestion to combine the cited references in the manner suggested by the Examiner. In rejecting claims 1-5 and 9-25, the Examiner suggests that the multi-band antennas used in Lindenmeier to transmit AMPS band and PCS band radiation could be combined with the antenna arrangement taught in Gregory. Nothing in either reference suggests such a combination. It is well established that there can be no suggestion for any proposed modification that would render the prior art invention unsatisfactory for its intended purpose. The purpose of Gregory is to allow microwave energy to be directionally radiated by causing the energy to radiate from cavities within the radiator via the slots (11 & 12). The frequencies of the radiated energy are controlled by the length of the slots used, and the direction of the radiated energy is controlled by the positioning of the slots on the face of the cavity. The antenna unit disclosed in Lindenmeier uses a patch antenna and a rod antenna to operate in frequency bands such as the AMPS band and the PCS band. Combining this antenna architecture (i.e., patch and rod antennas for AMPS band and PCS band operation) with Gregory would render Gregory unsuitable for its intended purpose, i.e., using slots to directionally radiate microwave energy of particular frequencies as determined by slot length.

As a result, there can be no suggestion to combine the references in the manner put forth by the Examiner in his rejection of claims 1-5 and 9-25.

In rejecting claims 6-8, the Examiner proposes a combination of Gregory and Weisbeck, specifically that the antenna positioning taught in Weisbeck could be combined with the antenna arrangement of Gregory. As discussed above, Gregory's intended purpose requires the use of slots on the cavity face to allow for radiation to escape from the cavity enclosures. Any attempt to incorporate a spiral arm antenna element into such a configuration would render Gregory unsuitable for its intended purpose, i.e., directionally radiating microwave energy. Thus, there can be no suggestion to combine the references in the manner put forth by the Examiner in his rejection of claims 6-8.

## II. The proposed combination fails to disclose all of the claim limitations

Even if the combinations of references proposed by the Examiner could be deemed to proper, the obviousness rejections would still fail because the combination of these references fails to disclose or even suggest all of the claim limitations.

Claim 1 has been rejected as unpatentable over Gregory in view of Lindenmeier. A combination of these references, however, fails to teach all of the claim limitations found in claim 1. Claim 1 recites *a radiating element, said element containing a first slot antenna operating in the PCS frequency band and a second slot antenna operating in the AMPS frequency band [...]*. This element is not taught in either reference. Gregory teaches using a radiating element containing slots to allow for directional radiation of microwave energy, but does not disclose or suggest an antenna capable of operation in the AMPS or PCS frequency band. Lindenmeier teaches operating in the AMPS or PCS frequency band using patch and

rod antennas. Neither reference discloses using a slot antenna operating in the PCS frequency band and a slot antenna operating in the AMPS band.

All remaining claims depend from claim 1, and thus are allowable for at least the same reason as set forth with respect to claim 1. Additionally, the elements recited in several dependent claims are not found in any cited reference. As a result, a brief discussion of the rejections of the dependent claims is set forth below.

Claims 2 and 3 each contain elements not found in either Gregory or Lindenmeier. Claim 2 recites the slot radiating element comprises a printed circuit board material. Claim 3 recites that the material is FR4. The radiating element in Gregory comprises metal, whereas Lindenmeier does not use a slot radiating element at all.

Claim 5 recites a reflector unit that is rectangular. Gregory teaches a reflector that is semi-cylindrical (see col. 2, lines 2-3. Lindenmeier does not disclose any reflector element.

Claim 9 recites that the amount of a signal from the radiating element that is reflected by the reflector is 90% or greater of the total radiated signal striking the reflector. There is no discussion of the amount of signal reflected by the reflector in Gregory, and there is no reflector in Lindenmeier.

Claim 10 recites printing the transmission line directly on the printed circuit board material. Both Gregory and Lindenmeier use coaxial cable transmission lines. As set forth with respect to claim 2, neither reference teaches using printed circuit board material to form the radiating element. Clearly, neither reference teaches using transmission lines printed on printed circuit board material.

Claims 12, 15, and 17 recite the antenna dimensions of the claimed antenna. The Examiner has made the conclusory statement that the dimensions of the antenna in Gregory can be scaled to the recited values for operation in the desired frequency band. This assertion

is incorrect. The suggested dimensions taught in Gregory provide for the slot to be one-half of the wavelength of the radiated energy. An AMPS band signal has a wavelength of approximately 13 inches. Using the scale taught in Gregory, the AMPS slot would be approximately 6.5 inches in length, which is over a full inch longer than the AMPS slot used in the present invention. Correspondingly, a longer slot will result in larger overall unit dimensions. Thus, the dimensions in Gregory cannot be scaled to the values recited in the present invention. Furthermore, the specific dimensional claim limitations of claims 12, 15, and 17 are not disclosed in either Gregory or Lindenmeier.

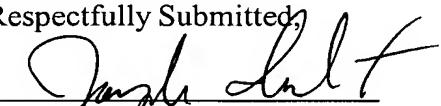
Claim 18-22 recite gain performance characteristics of the slot antennas. No gain characteristics are taught in Gregory. Lindenmeier does not teach slot antennas, thus no gain performance characteristics of slot antennas can be found in Lindenmeier.

#### CONCLUSION

For the reasons set forth above, the obviousness rejections under 35 U.S.C. §103 should be withdrawn. Independent claim 1, and all claims depending from claim 1, are in condition for allowance. Applicant respectfully requests reconsideration and issuance of the subject application. If any issues remain that preclude issuance of this application, the Examiner is urged to contact the undersigned attorney.

Respectfully Submitted,

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Date

  
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